digital signature itself can contain security attributes about the package. The security attributes can be used by the package manager to prevent versions updates from a source other than the signer. Furthermore, a vendor may include software packages from third parties as dependencies in the distribution unit and the package manager uses the digital signatures on each dependent package to direct the corresponding components into different local directories.

[0075] In one embodiment of the code store data structure implemented in the Microsoft Windows environment, the system registry file is used as the repository for the code store entries and the package manager accesses the entries through the standard registry interface provided by the operating system.

[0076] Summary

[0077] The particular methods performed by the package manager of an exemplary embodiment of the invention have been described. The method performed by the package has been shown by reference to flowcharts including the steps from **300** to **355** during installation of a software package, the steps **370** to **375** during execution of a software package, and steps **380-385** during uninstallation of a software package. Additionally, an exemplary embodiment of a code store data structure has been described.

Open Software Description Implementation

[0078] In this section of the detailed description, a particular implementation of the invention is described that formats the manifest file using an Open Software Description (OSD) format. OSD specifies a vocabulary used for describing software packages and their dependencies for client computers which is a subset of the Extensible Markup Language (XML). XML is similar to the Hypertext Markup Language (HTML) used to write Web pages and provides a general method of representing structured data in the form of lexical trees. Using the XML model, markup tags in the OSD vocabulary are represented as elements of a tree. The three basic relationships between elements are "parent-of, ""child-of," and "sibling-of." Distant relationships can be formed from recursive applications of the three basic ones. The basic XML elements that compose the OSD format are shown in Table 1 below. Additional information on the OSD vocabulary can be found in the Specification for the *Open Software Description (OSD) Format* published on Aug. 11, 1997, and available for download from either Microsoft Corporation or Marimba, Inc.

TABLE 1

Element	ABSTRACT
Content	<string>
Child of	SOFTPKG
Element	CODEBASE
Attributes	SIZE=<max-KB> -- the maximum allowable size for the software archive file. "Kilobytes" is the unit of measure. If SIZE is exceeded, then the software will not be downloaded. HREF=<URL> -- points to the archive to be downloaded. FILENAME=<string> -- specifies a file contained within the same archive as the OSD. If the OSD is used as a stand-alone file, then this attribute is ignored.
Child of	IMPLEMENTATION
Element	DEPENDENCY
Attributes	ACTION= (Assert I Install) -- Assert means: Ignore this SOFTPKG entirely if the dependency is not already present on the client's machine. Install means: If the dependency is not already present on the client's machine, go get it, then install it, so that the SOFTPKG has all the pieces it needs.
Child of	SOFTPKG, IMPLEMENTATION
Parent of	SOFTPKG
Element	DISKSIZE
Attributes	VALUE=<KB-number> -- approximate minimum number of bytes of disk space required by this implementation. "Kilobytes" is the unit of measure.
Child of	IMPLEMENTATION
Element	IMPLEMENTATION
Attributes	None Supported
Child of	SOFTPKG
Parent of	CODEBASE, DEPENDENCY, DISKSIZE, IMPLTYPE, LANGUAGE, OS, PROCESSOR, VM
Element	IMPLTYPE
Attribute	VALUE=<string> -- the type of the implementation.
Child of	IMPLEMENTATION
Element	LANGUAGE
Attributes	VALUE= <string> -- uses language codes as specified in ISO 639.
Child of	IMPLEMENTATION
Element	LICENSE
Attributes	HREF
Child of	SOFTPKG
Element	MEMSIZE
Attributes	VALUE = <KB-number> approximate minimum number of bytes of memory required by this implementation during execution. "Kilobytes" is the unit of measure.
Child of	IMPLEMENTATION
Element	OS
Attributes	VALUE= <string> -- see Appendix B for a list of possible values.
Child of	IMPLEMENTATION
Element	OSVERSION
Attributes	VALUE=<string>
Child of	OS
Element	PROCESSOR
Attributes	VALUE= <string> -- see Appendix B for a list of possible values.
Child of	IMPLEMENTATION
Element	SOFTPKG
Attributes	HREF -- indicates the Web page associated with a software distribution. Optional. NAME=<string> -- the name of the distribution. For a given SOFTPKG, this attribute should be a unique identifier. The client can use NAME to distinguish one SOFTPKG from all others. A software package's "friendly-name" is specified by using the TITLE element. VERSION=<string>
Child of	DEPENDENCY
Parent of	ABSTRACT, CODEBASE, IMPLEMENTATION, DEPENDENCY, TITLE
Element	TITLE
Content	<string>
Child of	SOFTPKG
Element	VM
Attributes	VALUE
Child of	IMPLEMENTATION

[0079] The OSD vocabulary can be used in a stand-alone XML manifest file to declare the dependencies between different software components for different operating systems and languages. The OSD file provides instructions that can be used to locate and install only the required software components depending on the configuration of the target machine and what software is already present. The OSD formatted manifest file also can be embedded in an archive file, such as a Java Archive (.JAR) file, or a composite, compressed file, such as a cabinet (.CAB) file, that contains the component's distribution unit to form a distribution unit file.